

Question 1 Write a program to calculate the volume, surface area, and circumference of a capsule having radius r ranging from 6 to N in increments of 6 and side length a, where N and a are determined by the user.

ScreenShot-1:

```
(base) PS D:\study\Main learning\saint_mary> python .\code_base_1.py
Enter the value of 'N': 45
Enter the value of 'a': 6
This program prints the volume, surface area& circumference of a capsule having radius r ranging from 6 to N in increments of 6 and side lengths a.
```

Radius	Volume	Surface Area	Circumference
6	1583.363	678.584	37.6991
12	9952.566	2261.9467	75.3982
18	30536.281	4750.0881	113.0973
24	68763.18	8143.0082	150.7964
30	130061.936	12440.7069	188.4956
36	219861.22	17643.1843	226.1947
42	343589.705	23750.4405	263.8938

ScreenShot-2:

```
(base) PS D:\study\Main learning\saint_mary> python .\code_base_1.py
Enter the value of 'N': 54
Enter the value of 'a': 2.50
This program prints the volume, surface area& circumference of a capsule having radius r ranging from 6 to N in increments of 6 and side lengths a.
```

Radius	Volume	Surface Area	Circumference
6	1187.522	546.6371	37.6991
12	8369.203	1998.0529	75.3982
18	26973.715	4354.2474	113.0973
24	62429.729	7615.2206	150.7964
30	120165.919	11780.9725	188.4956
36	205610.956	16851.503	226.1947
42	324193.512	22826.8122	263.8938
48	481342.26	29706.9001	301.5929
54	682485.871	37491.7667	339.292

ScreenShot-3:

```
(base) PS D:\study\Main learning\saint_mary> python .\code_base_1.py
Enter the value of 'N': 100
Enter the value of 'a': 10
This program prints the volume, surface area& circumference of a capsule having radius r ranging from 6 to N in increments of 6 and side lengths a.
```

Radius	Volume	Surface Area	Circumference
6	2035.752	829.3805	37.6991
12	11762.123	2563.5396	75.3982
18	34607.785	5202.4774	113.0973
24	76001.409	8746.1939	150.7964
30	141371.669	13194.6891	188.4956
36	236147.237	18547.963	226.1947
42	365756.783	24806.0156	263.8938
48	535628.981	31968.8468	301.5929
54	751192.503	40036.4568	339.292
60	1017876.02	49008.8454	376.9911
66	1341108.205	58886.0127	414.6902
72	1726317.73	69667.9587	452.3893
78	2178933.266	81354.6834	490.0885
84	2704383.487	93946.1867	527.7876
90	3308097.064	107442.4688	565.4867
96	3995502.67	121843.5295	603.1858

Question 2 Write a program to determine which project should be executed using cost-benefit analysis. If the upfront cost is incurred, using the cashflow during a single period and the discount rate, calculate the Net Present Value (NPV) of the project. Also, determine whether the project is viable by comparing projects based on their anticipated revenue and NPV value.

ScreenShot-1:

```
(base) PS D:\study\Main learning\saint_mary> python .\code_base_2.py
Enter the number of projects: 2

Enter the name of the project: Antila
Enter the upfront cost for project Antila: 45000
Enter rate of return or discount rate (in %): 12
Enter the duration (in years): 3
Enter the cash inflow-outflows during year 1: 10000
Enter the cash inflow-outflows during year 2: 37000
Enter the cash inflow-outflows during year 3: 19000

Enter the name of the project: Blue Dragon
Enter the upfront cost for project Blue Dragon: 35000
Enter rate of return or discount rate (in %): 12
Enter the duration (in years): 2
Enter the cash inflow-outflows during year 1: 27000
Enter the cash inflow-outflows during year 2: 27000
```

Antila			
Year	Cash Inflows/Outflows	PV Factor	Amount
1	\$ 10,000.00	0.8929	\$ 8,929.00
2	\$ 37,000.00	0.7972	\$ 29,496.40
3	\$ 19,000.00	0.7118	\$ 13,524.20

```
Total Income: $66,000.00
Present Value of Future Benefits: $51,949.60
Present Value of Future Costs: $45,000.00
Net Present Value(NPV): $6,949.60
```

Blue Dragon			
Year	Cash Inflows/Outflows	PV Factor	Amount
1	\$ 27,000.00	0.8929	\$ 24,108.30
2	\$ 27,000.00	0.7972	\$ 21,524.40

```
Total Income: $54,000.00
Present Value of Future Benefits: $45,632.70
Present Value of Future Costs: $35,000.00
Net Present Value(NPV): $10,632.70

The Highest income is generated by project: Antila
The project the company should be executing is: Blue Dragon
```

## ScreenShot-2:

```
(base) PS D:\study\Main learning\saint_mary> python .\code_base_2.py
Enter the number of projects: 3

Enter the name of the project: Orian
Enter the upfront cost for project Orian: 100000
Enter rate of return or discount rate (in %): 6
Enter the duration (in years): 3
Enter the cash inflow-outflows during year 1: 50000
Enter the cash inflow-outflows during year 2: 30000
Enter the cash inflow-outflows during year 3: 60000

Enter the name of the project: Gridlock
Enter the upfront cost for project Gridlock: 45000
Enter rate of return or discount rate (in %): 2
Enter the duration (in years): 2
Enter the cash inflow-outflows during year 1: 30000
Enter the cash inflow-outflows during year 2: 20000

Enter the name of the project: Titan
Enter the upfront cost for project Titan: 80000
Enter rate of return or discount rate (in %): 3
Enter the duration (in years): 3
Enter the cash inflow-outflows during year 1: 40000
Enter the cash inflow-outflows during year 2: 20000
Enter the cash inflow-outflows during year 3: 50000
```

Orian				
Year	Cash Inflows/Outflows	PV Factor		Amount
1	\$ 50,000.00	0.9434	\$	47,170.00
2	\$ 30,000.00	0.89	\$	26,700.00
3	\$ 60,000.00	0.8396	\$	50,376.00
Total Income: \$140,000.00				
Present Value of Future Benefits: \$124,246.00				
Present Value of Future Costs: \$100,000.00				
Net Present Value(NPV): \$24,246.00				

Gridlock				
Year	Cash Inflows/Outflows	PV Factor		Amount
1	\$ 30,000.00	0.9804	\$	29,412.00
2	\$ 20,000.00	0.9612	\$	19,224.00
Total Income: \$50,000.00				
Present Value of Future Benefits: \$48,636.00				

```

Present Value of Future Benefits: $48,636.00
Present Value of Future Costs: $45,000.00
Net Present Value(NPV): $3,636.00

Titan
-----
Year      |      Cash      |      PV Factor      |      Amount
          | Inflows/Outflows |                     |
-----
1         | $    40,000.00  |      0.9709         | $    38,836.00
2         | $    20,000.00  |      0.9426         | $    18,852.00
3         | $    50,000.00  |      0.9151         | $    45,755.00
Total Income: $110,000.00
Present Value of Future Benefits: $103,443.00
Present Value of Future Costs: $80,000.00
Net Present Value(NPV): $23,443.00

The Highest income is generated by project: Orian
The project the company should be executing is: Orian
(base) PS D:\study\Main learning\saint_mary>

```

ScreenShot-3:

```

(base) PS D:\study\Main learning\saint_mary> python .\code_base_2.py
Enter the number of projects: 2

Enter the name of the project: Mega
Enter the upfront cost for project Mega: 50000
Enter rate of return or discount rate (in %): 10
Enter the duration (in years): 2
Enter the cash inflow-outflows during year 1: 40000
Enter the cash inflow-outflows during year 2: 30000

Enter the name of the project: Maria
Enter the upfront cost for project Maria: 20000
Enter rate of return or discount rate (in %): 30
Enter the duration (in years): 2
Enter the cash inflow-outflows during year 1: 40000
Enter the cash inflow-outflows during year 2: 60000

Mega
-----
Year      |      Cash      |      PV Factor      |      Amount
          | Inflows/Outflows |                     |
-----
1         | $    40,000.00  |      0.9091         | $    36,364.00
2         | $    30,000.00  |      0.8264         | $    24,792.00
Total Income: $70,000.00
Present Value of Future Benefits: $61,156.00
Present Value of Future Costs: $50,000.00
Net Present Value(NPV): $11,156.00

Maria
-----
Year      |      Cash      |      PV Factor      |      Amount
          | Inflows/Outflows |                     |
-----
1         | $    40,000.00  |      0.7692         | $    30,768.00
2         | $    60,000.00  |      0.5917         | $    35,502.00
Total Income: $100,000.00
Present Value of Future Benefits: $66,270.00
Present Value of Future Costs: $20,000.00
Net Present Value(NPV): $46,270.00

The Highest income is generated by project: Maria
The project the company should be executing is: Maria


```

Question 3 The following table shows vacation days taken by employees.

1. There are functional dependencies in this table, so first, normalise the relation/table to the second normal form (2NF). Please show the resulting table(s) after the normalization.


38

39 • `select * from Emp_details;`

Result Grid |  Filter Rows:

	EmployeeId	Department	EmployeeName
▶	12	Sales	Luke Ye
	13	Marketing	Mark Brown
	14	Management	John Smith
	15	Marketing	Mark Brown
	16	Engineering	James Tevlin
	17	HR	Ross Becker
•	NULL	NULL	NULL

40 • `select * from vacation_details;`

Result Grid |  Filter Rows:

	EmployeeId	VacationYear	VacationDays
▶	12	2011	6
	12	2012	1
	12	2013	2
	13	2012	7
	14	2011	13
	15	2013	8
	15	2014	2
	16	2011	4
	16	2012	3
	17	2012	4
	17	2013	2
•	NULL	NULL	NULL

2. Using the table(s) in 2NF, write a query to display the total vacation days per year for each employee, sorted by employee name and year.



```

41 • select a.EmployeeId,a.EmployeeName,a.Department,b.VacationYear,b.VacationDays
42 from Emp_details as a inner join vacation_details as b on a.EmployeeId=b.EmployeeId
43 order by a.EmployeeName , b.VacationYear;
44

```

Result Grid   Filter Rows: <input type="text"/>   Export:    Wrap Cell Content: 					
	EmployeeId	EmployeeName	Department	VacationYear	VacationDays
▶	16	James Tevlin	Engineering	2011	4
	16	James Tevlin	Engineering	2012	3
	14	John Smith	Management	2011	13
	12	Luke Ye	Sales	2011	6
	12	Luke Ye	Sales	2012	1
	12	Luke Ye	Sales	2013	2
	13	Mark Brown	Marketing	2012	7
	15	Mark Brown	Marketing	2013	8
	15	Mark Brown	Marketing	2014	2
	17	Ross Becker	HR	2012	4
	17	Ross Becker	HR	2013	2